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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YU-HIS WANG,
WEN-HXIANG TSENG, and WEI-JEN HUANG

Appeal 2009-005720
Application 09/847,511
Technology Center 1700

Decided: August 25, 2009

Before CHARLES F. WARREN, PETER F. KRATZ, and
CATHERINE Q. TIMM, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 1 through 7 and 9 through 20 in the Office Action mailed May 18, 2004. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (September 13, 2004).

We dismiss the appeal with respect to claims 1 through 4 and 7.

Appellants did not respond as required under 37 C.F.R. § 41.50(a)(2) to the Supplemental Examiner's Answer mailed December 15, 2005, further considering grounds of rejection of claims 1 through 4 and 7, in response to our Remand entered October 25, 2005, in Appeal No. 2005-2040 in this Application. *See* Rem. 4:6-25.

Thus, claims 5, 6, and 9 through 20 remain for consideration on appeal.

We affirm the decision of the Primary Examiner.

Claim 5, dependent on independent claim 1, and independent claim 9 illustrate Appellants' invention of a wet stripping apparatus for removing unwanted film layers from a wafer surface and a method for removing unwanted film layers from a wafer surface by wet stripping, respectively, and are representative of the claims on appeal:

1. A wet stripping apparatus for removing unwanted film layers from a wafer surface comprising:

a tank body for holding a volume of a stripper solution therein;

a wafer holder for holding at least one wafer therein in a vertical position such that a planar surface of the wafer is parallel to a vertical tank wall of said tank body; and

means for reciprocally moving said wafer holder in an up-and-down motion with said at least one wafer immersed in said stripper solution at a frequency of up to 100 cycle/min.

5. A wet stripping apparatus for removing unwanted film layers from a wafer surface according to claim 1, wherein said means for reciprocally moving said wafer is an air cylinder assembly.

9. A method for removing unwanted film layers from a wafer surface comprising the steps of:

providing a tank body and filling the tank body with a volume of a stripper solution;

providing a wafer holder holding at least one wafer therein in a vertical position with a planar surface of the wafer parallel to a vertical tank wall of said tank body;

mounting said wafer holder in said tank body immersed in said stripper solution; and

moving said wafer holder reciprocally in an up-and-down motion with said at least one wafer immersed in said stripper solution at a frequency of not more than 100 cycle/min.

The Examiner relies upon the evidence in these references (Ans. 3):[1]

Komatsuzaki	4,417,945	Nov. 29, 1983
Noguchi	4,657,631	Apr. 14, 1987
Erk	5,593,505	Jan. 14, 1997
Ward	5,988,186	Nov. 23, 1999

Handbook of Semiconductor Wafer Cleaning Technology p. 24 (Werner Kern, ed., Noyes Publications. 1993) (hereinafter "Handbook").

Appellants request review of the following grounds of rejection of the appealed claims advanced on appeal by the Examiner (Br. 4-5):

Claims 5 and 6 under 35 U.S.C. § 102(b) over Komatsuzaki (Ans. 3);

claims 9 and 15 under 35 U.S.C. § 103(a) over Komatsuzaki in view of Erk (Ans. 6);

claims 10 and 11 under 35 U.S.C. § 103(a) over Komatsuzaki in view of Erk further in view of Ward (Ans. 9);

claims 12, 13, 16, 17, and 20 under 35 U.S.C. § 103(a) over Komatsuzaki in view of Erk further in view of Noguchi (Ans. 10);

claim 14 under 35 U.S.C. § 103(a) over Komatsuzaki view of Erk further in view of Handbook (Ans. 11);

claim 18 under 35 U.S.C. § 103(a) over the combined teachings of Komatsuzaki, Erk, and Noguchi further in view of Ward (Ans. 12); and

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[1] We consider the Appeal Brief filed November 3, 2004, and the Examiner's Answer mailed December 15, 2005.

claim 19 under 35 U.S.C. § 103(a) over the combined teachings of Komatsuzaki, Erk, and Noguchi further in view of Handbook (Ans. 13)

Appellants argue the claims in each ground of rejection as a group. Br. 6, 9,14, 15, and 16. Thus, we decide this appeal based on claims 5, 9, 10, 12, 14, 18, and 19 as representative of the grounds of rejection and Appellants' groupings of claims. 37 C.F.R. § 41.37(c)(1)(vii) (2005).

Issues

The issues in this appeal are whether Appellants have shown that the evidence in Komatsuzaki does not support the Examiner's finding of prima facie anticipation of the invention encompassed by claim 5, and whether Appellants have shown that the evidence in the combined teachings of Komatsuzaki and Erk alone and as further combined with one or more of Ward, Noguchi, and Handbook, does not support the Examiner's conclusion of prima facie obviousness of the invention encompassed by claims 9, 10, 12, 14, 18, and 19.

Claim Interpretation

The plain language of representative claim 5, dependent on claim 1, specifies a wet stripping apparatus comprising at least, among other things, any air cylinder assembly which reciprocally moves a wafer holder in an up-and-down motion at a frequency of up to 100 cycle/min. Thus, the frequency range of the reciprocally up-and-down motion is from 1 to 100 cycle/min. Similarly, the plain language of representative claim 9 specifies a method of wet stripping a wafer surface comprising at least the steps including, among other things, the step of reciprocally moving a wafer holder immersed in stripper solution in a tank body, in an up-and-down motion with the wafer in the wafer holder remaining immersed in stripper

solution, at a frequency of up to 100 cycle/min. The frequency range of the reciprocally up-and-down motion is from 1 to 100 cycle/min. *See*, *e.g.*, *In re Icon Health and Fitness, Inc.*, 496 F.3d 1374, 1378-79 (Fed. Cir. 2007); *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004), and cases cited therein; *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997).

Findings of Fact

We find Komatsuzaki would have disclosed to one of ordinary skill in this art, as illustrated by embodiments depicted in Figure 4, an apparatus for chemically etching wafers 11, 12 in wafer holders 21, 22 in vat 5, wherein, among other things, holder arms 10, 10 of wafer holders 21, 22 are reciprocally moved "up and down by means of a mechanism with a cylinder and a piston, cums [sic], crankshafts and the like (not shown in the figure) so that the wafer materials 11,12 held by the sucking units 21,22 are also moved up and down." Komatsuzaki col. 4, ll. 60-65; *see also* col. 2, ll. 7-38, and col. 3, ll. 46-63.

We find Erk would have disclosed to one of ordinary skill in this art, an apparatus for cleaning wafers in which the wafer is reciprocated in a generally up and down motion "so that the central region of the wafer repeatedly passes through the surface of the [clearing] liquid." Erk col. 1, l. 60 to col. 2, l. 7; *see also* col. 5, ll. 552-63, and Figs, 2 and 3. The apparatus has an ultrasonic tank and "ultrasonic energy will clean a portion of a . . . wafer located at or just slightly below the gas-liquid-interface at a faster rate than . . . well below the gas-liquid-interface" which is at the surface of the liquid in the tank. Erk col. 3, ll. 2-3 and 7-15; *see also* abstract. The wafers are reciprocated up and down at a rate of

approximately 20 cycle/min. to about 240 cycle/ min., and preferably 60 cycle/min., which affects the cleaning time for the wafer. Erk col. 6, ll. 22-41.

A discussion of Ward, Noguchi, and Handbook is not necessary to our decision.

Opinion

We considered the totality of the record in light of Appellants' arguments with respect to claims 5, 9, 10, 12, 14, 18, and 19, and the grounds of rejection advanced on Appeal. *See, e.g., In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("'On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998); *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992) ("After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument.") (citing, inter alia, *In re Spada*, 911 F.2d 705, 707 n.3 (Fed. Cir. 1990)).

Claim 5: Komatsuzaki

We are of the opinion Appellants have not shown that the evidence in Komatsuzaki does not support the Examiner's finding of prima facie anticipation of the invention encompassed by claim 5. Appellants do not dispute that Komatsuzaki's cylinder assembly that reciprocally moves the wafer holder up and down in the vat meets the claimed air cylinder assembly. Br. 6-8. Appellants submit there is no disclosure in Komatsuzaki

that the apparatus described therein is capable of reciprocally moving the wafer holder in an up-and-down motion at a frequency range of from 1 to 100 cycle/min. as claimed. Br. 7-8. We disagree. As the Examiner points out, Komatsuzaki describes the apparatus as reciprocally moving the wafer holder in an up-and-down motion in the same manner as the claimed apparatus, and thus one of ordinary skill in this art would reasonably infer from Komatsuzaki's disclosure that the described apparatus would be capable of a cycle/min. frequency falling within the claimed range of from 1 to 100 cycle/min. Ans. 4-5. *See, e.g., In re Graves*, 69 F.3d 1147, 1152 (Fed. Cir. 1995) ("A reference anticipates a claim if it discloses the claimed invention 'such that a skilled artisan could take its teachings in combination with his own knowledge of the particular art and be in possession of the invention.'")(*quoting In re LeGrice*, 301 F.2d 929, 936 (CCPA 1962)); *In re Preda*, 401 F.2d 825, 826-27 (CCPA 1968) ("[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." (citation omitted)).

On this record, Komatsuzaki's described apparatus reasonably appears to be capable of the claimed cycle range, thus shifting the burden to Appellants to established otherwise. Appellants have not carried the burden of patentably distinguishing the claimed apparatus encompassed by claim 5 over the apparatus described by Komatsuzaki even though the cycle/min. frequency rate of Komatsuzaki's apparatus is not disclosed therein. *See, e.g., In re Spada*, 911 F.2d 705, 708-09 (Fed. Cir. 1990); *In re Best*, 562 F.2d 1252, 1255-56 (CCPA 1977); *In re Skoner*, 517 F.2d 947, 950-51

(CCPA 1975) ("Appellants have chosen to describe their invention in terms of certain physical characteristics . . . . Merely choosing to describe their invention in this manner does not render patentable their method which is clearly obvious in view of [the reference]." (citation omitted)).

Accordingly, we have again evaluated all of the evidence of anticipation found in Komatsuzaki with Appellants' countervailing evidence of and argument for non-anticipation, and based thereon we conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 5 and 6 would have been anticipated as a matter of fact under 35 U.S.C. § 102(b).

Claim 9: Komatsuzaki and Erk

We are of the opinion Appellants have not shown that the evidence in the combined teachings of Komatsuzaki and Erk does not support the Examiner's conclusion of prima facie obviousness of the invention encompassed by claims 9. Appellants contend that one of ordinary skill in this art would not have combined Komatsuzaki and Erk because the cleaning methods differ, pointing out that Komatsuzaki immerses the wafer in the cleaning solution without using sonic energy while Erk half immerses the wafer in the cleaning solution and uses sonic energy. Br. 10-12; *see above* pp. 5-6. We disagree.

We agree with the Examiner that one of ordinary skill in this art would have recognized that the wafer cleaning methods of each of Komatsuzaki and Erk reciprocally move a wafer holder in an up-and-down motion in a cleaning liquid in a tank, and thus are related methods for cleaning a wafer even if the extent of the reciprocally up-and-down motion

of the wafer holder in the liquid differs and Erk further employs sonic energy. Ans. 15-16. Thus, on this record, we further agree with the Examiner that the combined teachings of Komatsuzaki and Erk would have reasonably suggested to one of ordinary skill in this art to determine a workable or optimum range of the frequency of the reciprocally move a wafer holder in an up-and-down motion in a cleaning liquid in cycle/min as Erk demonstrates this measurement is a result effective variable. *See, e.g., In re Boesch*, 617 F.2d 272, 276 (CCPA 1980)("[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art."); *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)("[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."); With respect to the claimed frequency range, we found above that one of ordinary skill in this art would reasonably infer from Komatsuzaki's disclosure that the described apparatus would be capable of a cycle/min. frequency falling within the claimed range of from 1 to 100 cycle/min..

Accordingly, we have again evaluated all of the evidence of anticipation and of obviousness found in the combined teachings of Komatsuzaki and Erk with Appellants' countervailing evidence of and argument for nonobviousness, and based thereon we conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 9 and 15 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

Claims 10, 12, 14, 18, and 19: Komatsuzaki and Erk further combined with one or more of Ward, Noguchi, and Handbook

We are further of the opinion Appellants have not shown that the evidence in the combined teachings of Komatsuzaki and Erk as further combined with one or more of Ward, Noguchi, and Handbook does not support the Examiner's conclusion of prima facie obviousness of the invention encompassed by claims 10, 12, 14, 18, and 19. The sole argument advanced by Appellants is that independent method claims 9 and 16 are not rendered obvious by the combined teachings of Komatsuzaki and Erk as previously argued, and the further addition of one or more of Ward, Noguchi, and Handbook does not "lend any additional weight" to the combination of references of Komatsuzaki and Erk. Br. 14-15, 15-16, 16, and 17.

We did not subscribe to Appellants' view of the combined teachings of Komatsuzaki and Erk above and remain of that view here.

Accordingly, we have again evaluated all of the evidence of anticipation and of obviousness found in the combined teachings of Komatsuzaki and Erk further combined with one or more of Ward, Noguchi, and Handbook with Appellants' countervailing evidence of and argument for nonobviousness, and based thereon we conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 10 through 14 and 16 through 20 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The Primary Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(v).

AFFIRMED

PL Initial:
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